Office of Resource Conservation

State of Illinois

Grant Proposal

April 2015

Project Number: T-101-R-1

Project Title: Status and Distribution Assessment of the Eryngium Stem Borer Moth in Illinois

Need:

Status: Eryngium Stem Borer (Papaipema eryngii) is listed as endangered in Illinois (17 Ill. Adm. Code 1010). It was first listed in 1991 as an endangered species because it was a species with a very restricted geographic range of which Illinois is a part and it occupies restricted habitats or has low populations in the state (Mankowski 2012).

The species recently underwent review by the US Fish and Wildlife Service for possible listing as federally endangered or threatened. A twelve-month finding published August 14, 2013 announced the Service's determination that listing as endangered or threatened is warranted, but is precluded by higher priority actions and the species will be added to the USFWS candidate species list until a time when priorities allow the Service to develop a proposed rule for listing (50 CFR Part 17).

NatureServe gives the species a global rank of G1G2 (critically imperiled/imperiled), noting that the species probably qualifies for a G1 rank, but there is some level of protection at known extant sites and some are well-managed. The national rank is N1N2 (critically imperiled/imperiled). It is ranked as S1 (critically imperiled) in Illinois. Other state rankings include an SX rank (presumed extirpated) in Indiana and an S1 rank (critically imperiled) in Arkansas, Kentucky, North Carolina, and Oklahoma. It is not ranked in Iowa (NatureServe 2013; Figure 1).

Total Range: Eryngium Stem Borer is endemic to the continental United States and its range, estimated by NatureServe based on historic and recent specimens, includes Arkansas, Illinois, Indiana, Iowa, Kentucky, North Carolina, and Oklahoma. It is presumed to have occurred from Missouri and the states between the prairie region and North Carolina, although no records are known from those areas (NatureServe 2013; Figure 1).

Illinois Distribution: Historic and current records for Eryngium Stem Borer were queried from multiple sources and reviewed by the Illinois Endangered Species Protection Board as it evaluated the species' status and distribution when making the decision to add it to the Illinois List of Endangered and Threatened Species. Descriptions here are based on information from the initial listing evaluation and information subsequently submitted to the Illinois Natural Heritage (Biotics 4) Database.

Historic records for Eryngium Stem Borer are noted as sparse (both in Illinois and range-wide) because identification of the species is made difficult due to cryptic larvae and pupae, and nocturnal adult

activity. In Illinois, the species is historically recorded only from locations in Cook County, with multiple collections made from 1915 – 1938 across a localized area that retained larger prairie remnants containing rattlesnake master (Eryngium yuccifolium), its host plant (Nyboer et al. 2006; INHS 2009; INHD 2013). More recent historic Illinois Natural Heritage (Biotics 4) Database (Database) element occurrence records (EOs) (classified as greater than 10 years old) have expanded the known distribution of the species to areas downstate. Combining the known historic collection records and the Database historic EOs, there are historic occurrences from 4 counties (EOs have been established from all 4 counties) and two Natural Division Sections (EOs have been established in both of the Sections) (Nyboer et al. 2006; INHD 2013). Based on the reported dispersal distances of the species and its habitat requirements, it is presumed that it historically occurred in additional counties/Natural Division Sections.

Currently, there are a total of 10 EOs (across 7 counties) in the Database for Eryngium Stem Borer (INHD 2013; Figure 2). Surveys to document presence of the species in Illinois have occurred with some irregularity over the last twenty-five years (Dietrich 2013, LaGesse and Walk 2010, LaGesse and Wilker 2008, LaGesse et. al 2009, Panzer and Derkovitz 1991). As described in the paragraph above for historic distribution, due to the survey/observation difficulties associated with the species and based on dispersal distances and habitat requirements, Eryngium Stem Borer may presently occur in more areas and across a larger area of the state. At the time of initial listing, location information was brought forth to establish 1 EO (in 1 county and within a single Natural Division Section) and since then 9 EOs (across 6 counties and 3 additional Natural Division Sections) have been added for the species: 4 EOs (3 naturally occurring EOs and 1 EO established by stocking) were added in the 1990s; 4 naturally occurring EOs were added in the 2000s; and, 1 naturally occurring EO has been added since 2010. The 1 EO that was established by stocking in the 1990s has had repeated subsequent observations. While new EOs have been added every decade since listing, not every EO is surveyed each year or regularly, so the number of EOs with observations in any given year or 5-year interval may not reflect the true status of the species. There have been recent observations (since 2002 – which are 10 or fewer years old at the time of the database query) at 8 EOs across 6 counties; representing 3 of the 4 counties and both of the Natural Division Sections with known historic distribution (INHD 2013; Tables 1, Figure 2).

Purpose and Objectives:

Recovery strategies addressed in this proposal include a combination of statewide surveys and monitoring, genetic analysis of extant Illinois populations and the development of a field guide pamphlet for monitoring. All of these recommended recovery strategies are outlined in the IDNR approved *Final Recovery Outline with Listing Review Triggers for the Illinois Endangered Eryngium Stem Borer (Papaipema erygnii) t (Mankowski et.al 2014)*.

Currently known extant populations in northern Illinois are disjunct from those in south-central Illinois by over 150 miles. While it is presumed that the species historically occupied the area in between, it is

unknown how much if any, movement of individuals took place between local and/or distant subpopulations.

This project proposal prescribes implementation of the following recovery strategies:

Recovery Strategy 1: Concurrently conduct genetic analysis of Illinois populations , confirm current status and distribution, and develop species-specific habitat suitability assessment criteria.

a. Conduct genetic analysis of the northern and south-central Illinois populations to determine genetic viability/health within, and compatibility between, respective populations. This action will be accomplished during the first two years of the grant.
b. Over the course of this grant, conduct surveys of all EOs and all known historic locales (museum/collection records for which no EOs have been established) to confirm current status and distribution. Surveys should cover information necessary to complete an Element Occurrence Reporting form and include the following specific information: the total number of individuals Eryngium Stem Borer observed at a location (based on the number of Rattlesnake Master plants with sign of larval infestation and a small sample of larva for captive rearing to confirm Eryngium Stem Borer identification); an estimate of the number of Rattlesnake Master plants present; an estimate of the area surveyed and what % of proximate suitable habitat the survey area represents (include a map and/or GPS polygon file); and, search effort (person hours). All occurrences shall be reported to the Illinois Natural Heritage (Biotics 4) Database as an element occurrence report (EO).

c. Develop species-specific habitat suitability assessment criteria for use in guiding management and evaluating sites for suitability and minimum habitat area, host plant stocking/density, and other features necessary to support minimum viable populations of Erynigum Stem Borer.

Recovery Strategy 3: Monitor current status and distribution

a. Develop a field guide pamphlet for staff use in identifying 1) Rattlesnake Master plants, 2) signs of larval impact to Rattlesnake Master plants, and 3) Eryngium Stem Borer adult moths, and to 4) provide direction for collecting larvae to deliver to an Illinois Eryngium Stem Borer (Papaipema eryngii) Recovery Planning Team identified individual who is authorized to rear the larva and verify identification.
b. Conduct surveys of known EOs annually to confirm presence/absence and population numbers of all EOs, within each 5-year cycle (a 5-year cycle is prescribed in the recovery outline, for this project, the time period will be for the grant period). Surveys should cover information necessary to complete an Element Occurrence Reporting form and include the following specific information: the total number of individual Eryngium Stem Borer observed at a location (based on the number of Rattlesnake Master plants with sign of larval infestation and a small sample of larvae for captive rearing to confirm Eryngium Stem Borer identification); an estimate of the

number of Rattlesnake Master plants present; an estimate of the area surveyed and what % of proximate suitable habitat the survey area represents (include a map and/or GPS polygon file); and, search effort (person hours).

c. Conduct surveys at two historic locales with no EOs to confirm presence/absence and population numbers (if present), within a 5-year period(a 5-year cycle is prescribed in the recovery outline, for this project, the time period will be for the grant period).
d. Based on the results of Recovery Strategy 1b and 1c., develop a survey design to search for new occurrences of Eryngium Stem Borer and additional suitable habitat in counties/Natural Division Sections known for historic and current populations where EOs have been established, as well as areas proximate to and in between the northern and south-central Illinois populations.

Expected Results and Benefits:

Recovery Strategy 1a: The genetic analysis of the northern and south-central populations will determine genetic viability/health within, and compatibility between, respective populations. This information will provide IDNR with management and recovery objectives and goals.

Recovery Strategy 1b, 3b, and 3c: Surveys will be conducted at all known EO's and historical locales of the Eryngium stem borer moth (Papaipema eryngii) providing IDNR current status of these populations and population estimates. Additionally, surveys will be conducted in suitable habitats in an effort to locate new populations of *Papaipema eryngii* in Illinois.

Recovery Strategy 3a and 3b: A field guide pamphlet will be developed for staff use in identifying 1) Rattlesnake Master plants, 2) signs of larval impact to Rattlesnake Master plants, and 3) Eryngium Stem Borer adult moths, and to 4) provide direction for collecting larvae (for possible rearing and/or identification). Results from 1a and 1b will be used to develop a survey design to search for new occurrences of Eryngium Stem Borer and additional suitable habitat.Achieve the recovery goal of achieving levels of status and distribution that may result in removal from Illlinois–endangered or Illinois-threatened listing status by the Illinois Endangered Species Protection Board, by achieving status review triggers identified in the *Recovery Planning Outline with Listing Review Triggers for the Illinois Endangered Eryngium Stem Borer (Papaipema eryngii)*.

Approach: Contractually hire a contractor to conduct genetic analysis of the northern and south-central Illinois populations to determine genetic viability/health within, and compatibility between the respective populations, using museum specimens or specimens from other collections. This genetic analysis will be completed within the first two years of the grant cycle.

Contractually hire contractors over the course of the three field seasons to conduct surveys of all known EO's and all known historic locales to confirm status and distribution. The contractor will also conduct

surveys at historic locales with no EO's to confirm presence/absence and determine population numbers, in addition, the contractor will survey potential habitat between the northern and south-central populations to determine presence/absence and determine population numbers. These surveys will provide IDNR with current statewide distribution information to better guide management, recovery efforts and identify any potential impacts to populations.

IDNR staff will assist with the development of the field guide pamphlet for staff us in identifying rattlesnake master plants, signs of larval impacts, Eryngium stem borer adult moths, and to determine provide direction for any potential collecting and in developing a survey design to search for new occurrences of Eryngium Stem Borer and additional suitable habitat. IDNR staff will also assist with surveys to determine presence/absence of the Eryngium stem borer moth on public lands and/or dedicated areas.

Useful Life: N/A

Geographical Location:

Eryngium Stem Borer (Papaipema eryngii) populations are known from the following seven Illinois Counties: Cook, Effingham, Fayette, Grundy, Livingston, Marion and Will. Project activities will include additional counties across most of northern and south-central Illinois as surveys will be conducted in counties where suitable habitat occurs and may be within range of natural recruitment, but for which records do not exist.
Figure 2. – Historic and current distribution of Eryngium Stem Borer (Papaipema eryngii) in Illinois.

Principle Investigators:

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Program Income: N/A

Budget Narrative:

PROJECT BUDGET

Project Title: Status and Distribution of the Eryngium Stem Borer Moth in Illinois
T-101-R-1
Project Time Frame: Start Date - (11/01/2015); End Date - (06/30/2019)

Budget Catagories	Federal Funds	Non-Federal Funds	Project Totals
Salaries and Wages	$0.00	$28,000.00	$28,000.00
Fringe Benefits	$0.00	$0.00	$0.00
Travel	$0.00	$0.00	$0.00
Equipment	$0.00	$0.00	$0.00
Materials and Supplies	$0.00	$0.00	$0.00
Contractual Services	$52,000.00	$0.00	$52,000.00
Other	$0.00	$0.00	$0.00
Total Direct Costs	$52,000.00	$28,000.00	$80,000.00
Modified Total Direct Cost (MTDC)	$52,000.00	$28,000.00	$80,000.00
Indirect Rate of 20%	$10,400.00		$10,400.00
Indirect Rate of 19.84 %		$5,555.20	$5,555.20
Unrecovered Indirect Rate		-$83.20	
Total Project Costs	$62,400.00	$33,472.00	$95,872.00
Percentage of Total Project Cost	65.00%	35.00%	100.00%

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Project Title: Habitat Enhanceme
T-100-D-1
Project Time Frame: Start Date - (

Budget Catagori
Salaries and Wages
Fringe Benefits
Travel
Equipment
Materials and Supplies
Contractual Services
Other
Total Direct Costs
Modified Total Direct Cost (MTDC)
Indirect Rate of 20%
Indirect Rate of 19.84 %
Unrecovered Indirect Rate
Total Project Costs
Percentage of Total Project Cost

BUDGET JUSTIFICATION				
Describe below the expenses included in each of the categories above. For the budget catagory of "Travel", break down the expenses between in-state, out-of-state and international travel. For each budget catagory justify the need for the expenses listed above by explaining what the cost consists of and how the proposed cost relates to the goals and objectives of the project.				
Salaries and Wages: The non-federal match is from		IDNR staff conducting statewide surveys of known, historic and potentia		
	areas of habitat that support populations of rattlesnake	borer moth (Papeipema erygnii). IDNR staff will also develop a field		
	guide pamphlet for staff us in identifying rattlesnake master plants, signs of larval impacts, Eryngium stem borer adult moths			
Fringe Benefits:				
Travel:				
Equipment:				
Materials and Supplies:				
Contractual Services: Federal funds will by used by		IDNR to contractually hire a contractor(s) to conduct surveys of known,		
	historic and potential areas of habitat that support populations of rattlesnake borer moth (Papaipema erygnii).			
Federal funds will also be used to hire a contractor to		conduct genetic analysis of the northern and south central populations of		
	Papaipema erygnii in Illinois to determine genetic	viability/health within and compatibility between respective populations		
	Other			

Multipurpose Projects: N/A

Relationship w/ Other Grants: N/A

Timeline: November 01, 2015 to June 30, 2019

The following activities will be conducted during the approximate time frames:

1. November 01 -2015 – June 30, 2017
   Conduct genetic analysis of the northern and south-central Illinois populations to determine genetic viability/health within, and compatibility between the respective populations, using museum specimens or specimens from other collections.

2. November 01, 2015 - June 30, 2019
   Conduct statewide surveys of all known EO's, all known historic locales and any potential habitats between the northern and south-central populations to confirm status and distribution,

3. November 01, 2015 – June 30, 2019
   Develop a field guide/pamphlet for use in identifying rattlesnake master plants, signs of larval impacts, Eryngium stem borer adult moths, and to determine provide direction for any potential collecting (for possible rearing and/or identification) and develop a survey design to search for new occurrences of Eryngium Stem Borer and additional suitable habitat.

4. November 01,2018 – June 30, 2019
   Prepare final SWG report for this grant

General:

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(i) **Substantial in Character and Design**

The project statement describes a need consistent with the -State Wildlife Grants (SWG); states a purpose and sets objectives, both of which are based on the need; uses a planned approach, appropriate procedures and research; and is cost effective.

(ii) **Compliance:**

The IDNR will use its CERP (Comprehensive Environmental Review Process) as a tool to aid the Department in meeting NEPA compliance for the project outlined under this grant proposal. It is the Department's policy to require CERP applications for all land disturbing activities unless those activities are covered by CERP exemptions.

All planned activities will also be in compliance with the Endangered Species Act. All determinations and documentation will be in accordance with the current established U.S. Fish and Wildlife Service protocols for section 7.

All planned activities will be in compliance with the National Historic Preservation Act and the Council on Historic Preservation Act. All determinations and documentation will be in accordance with the terms of the Programmatic Agreement, as amended, effective September 23, 2002.

When applicable, those planned activities which involve a floodplain and/or jurisdiction wetlands will be done in accordance with Presidential Executive Orders 11988 and 11990.

When applicable, those planned activities which involve programs and/or site improvements will be done in accordance with Section 504 of the Rehabilitation Act and the Americans with Disabilities Act.

When applicable, those planned activities which involve the use of pesticides, herbicides or other comparable chemicals will be done in accordance with current state and federal regulations to assure the safe and legal application of those chemicals. All chemicals will be applied in accordance with the manufacturers label instructions. All persons applying chemicals will be licensed by the Illinois Department of Agriculture as a chemical operator along with a licensed applicator, in accordance with Illinois state law.

(iii) 50 CFR Part 17 [Docket No. FWS–R3–ES–2013–0089; 4500030113]. 2013. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List the Rattlesnake-Master Borer Moth (Papaipema eryngii) as an Endangered or Threatened Species. Federal Register / Vol. 78, No. 157 / Wednesday, August 14, 2013.

520 ILCS 10/ Illinois Endangered Species Protection Act (1972 et seq.).

Dietrich, C.H. 2013. A limited Assessment of Endangered and Threatened Insects Associated with the IDOT Illiana Expressway Project Corridor in Will County, Illinois. A Report Prepared for the Illinois Department of Transportation, Springfield, Illinois. 6 pp.

ILL. ADM. CODE. Conservation § 1010: Illinois List of Endangered and Threatened Animals (1977 et seq.).

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LaGesse, V. R. and J. R. Wiker. 2008. An Insect Survey of the Upper Little Wabash River Watershed. A Report for the Illinois Department of Natural Resources - Conservation 2000 Program.

LaGesse, V. R., T.L. Esker and J. W. Walk. 2009. 2009 Monitoring of Papaipema eryngii , The Rattlesnake Borer Moth at Prairie Ridge State Natural Area and Twelve-Mile Prairie. A Report prepared for the Illinois Department of Natural Resources and The Illinois Endangered Species Protection Board. 25 pp.

LaGesse, V.R. and J.W. Walk. 2010. 2010 Rattlesnake Master Borer Moth, Twelve Mile Prairie – Effingham, Clay, Fayette and Marion Counties, Illinois. Miscellaneous Statewide Survey Program, Illinois Department of Transportation, Springfield, Illinois. 6 pp.

Mankowski, A., T.L. Esker and J. Walk. 2014. Final Recovery Planning Outline with Listing Status Review Triggers for the Illinois Endangered Eryngium Stem Borer (Papaipema eryngii). Illinois Endangered Species Protection Board and Illinois Department of Natural Resources. Springfield, Illinois. Published online at http://www.dnr.state.il.us/ESPB/recovery.html .

Mankowski, A. 2012. The Illinois Endangered Species Protection Act at Forty: a Review of the Act's Provisions and the Illinois List of Endangered and Threatened Species. Illinois Endangered Species Protection Board, Springfield, Illinois. 152 pp. Published online at: http://www.dnr.illinois.gov/ESPB/Pages/default.aspx.

NatureServe. 2013. NatureServe Explorer: An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed August 18, 2013).

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Panzer. R and G. Derkovitz, 1991. A Survey of the Butterflies and Papaipema Moths of the Grant Creek Prairie Nature Preserve, Will County, Illinois. A study completed for the Illinois Department of Conservation, Springfield, IL. 15pp.

U.S. Forest Service. 2003. Conservation Assessment for Eryngium Root Borer (Papaipema eryngii). U.S. Forest Service Eastern Region. Milwaukee, WI. 9pp.

Eryngium Stem Borer Moth (Papaipema eryngii) on rattlesnake master.

Photo by Vern LaGesse

Figure 1. Distribution and NatureServe status of Eryngium Stem Borer, by state and province (NatureServe 2013).

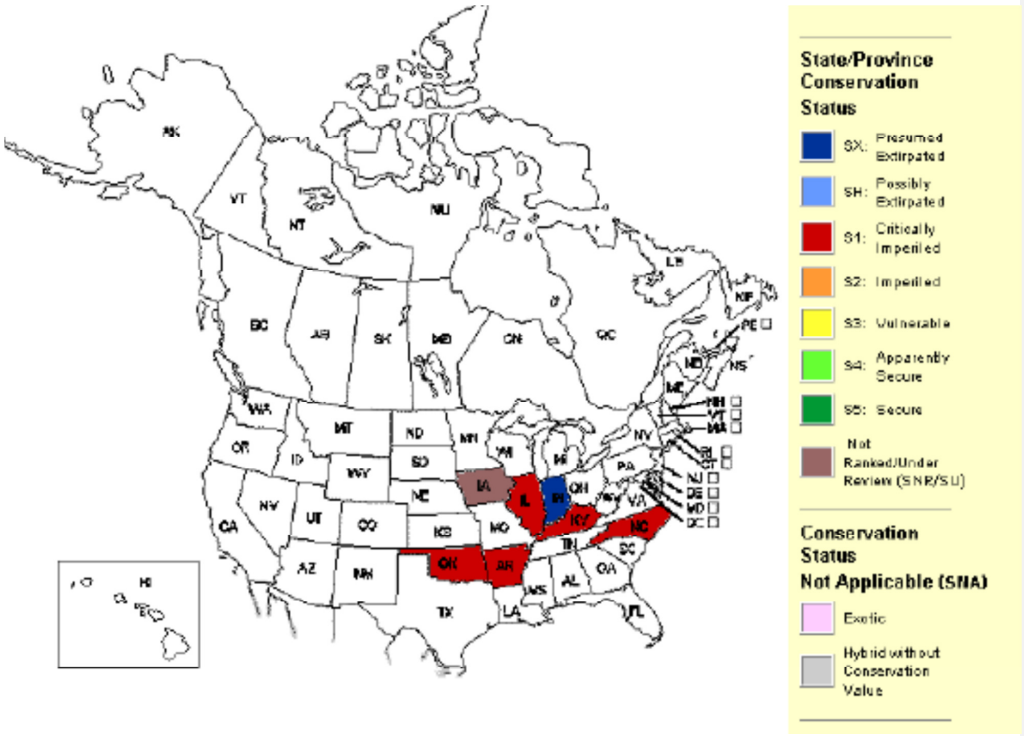

Figure 2. Historic and current distribution of Eryngium Stem Borer moth in Illinois.

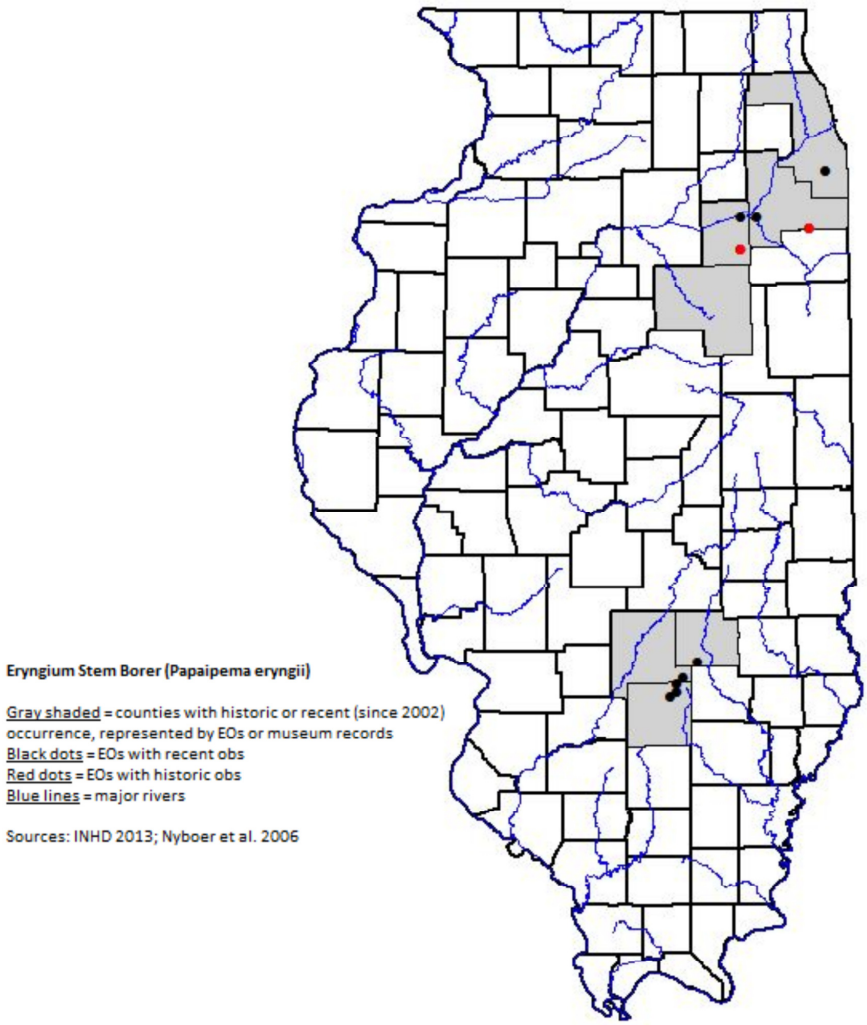

Table 1. Known Illinois County Distribution of Eryngium Stem Borer by County.

	Historic with no EO	EO with historic obs.	EO w/ recent (since 2002) obs.
Cook	**x**	**1**	**1**
Effingham			**1**
Fayette			**1**
Grundy		**1**	**1**
Livingston		**1**	
Marion			**3**
Will		**1**	**2**